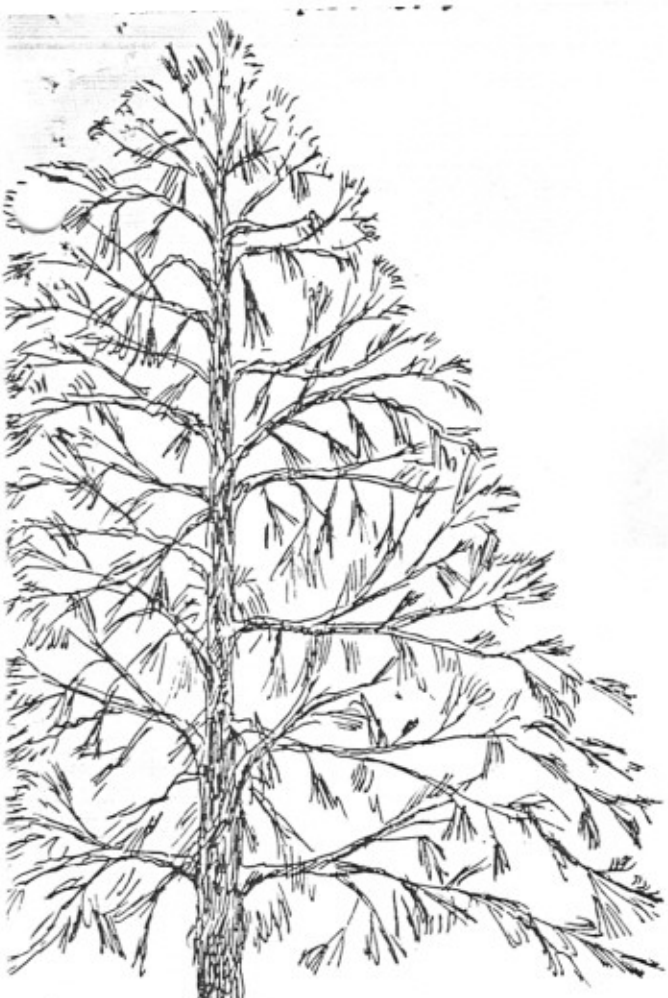
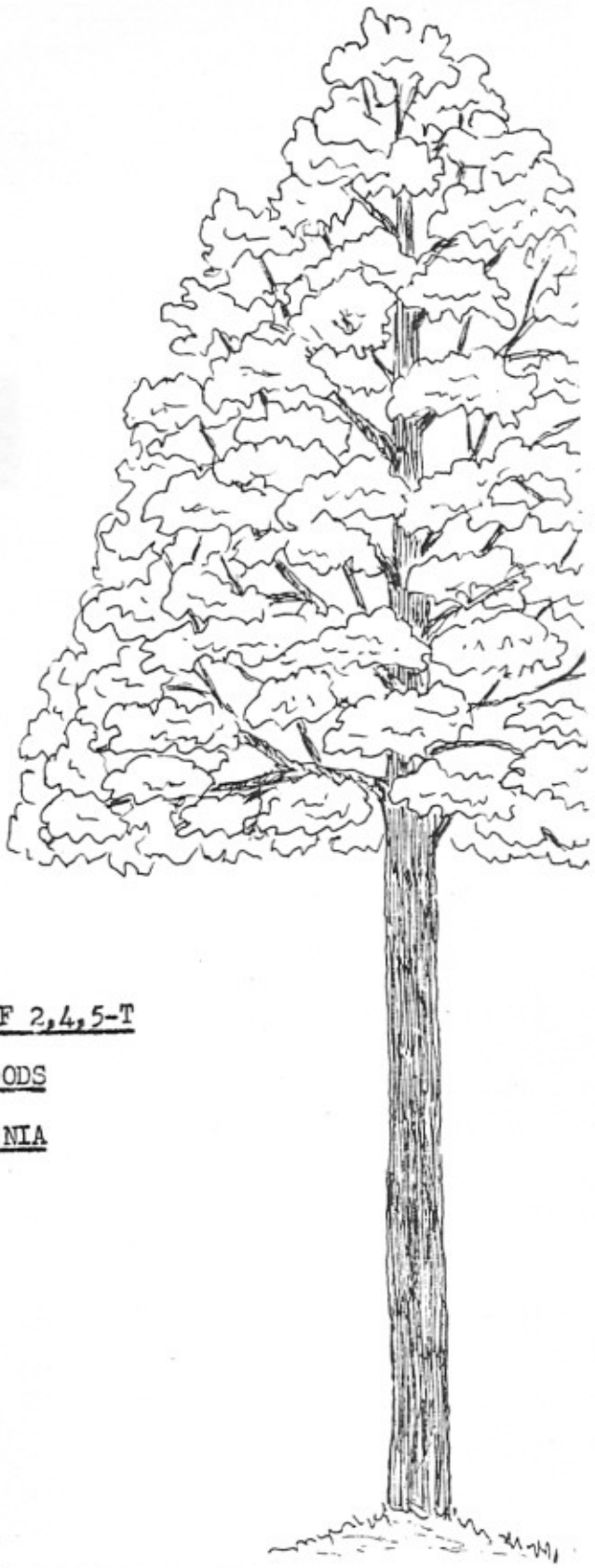
September 1957





RESULTS OF HELICOPTER SPRAYING OF 2,4,5-T TO CONTROL UNWANTED HARDWOODS IN CHARLOTTE COUNTY, VIRGINIA

KEEP VIRGINIA GREEN

PREVENT FOREST FIRES

DIVISION OF FORESTRY
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

Results of Helicopter Srpaying of 2,4,5-T to Control Unwanted Hardwoods in Charlotte County, Virginia

During late *August 1956 four different tracts in Charlotte County were aerially sprayed in an attempt to control unwanted hardwoods. All total, approximately 400 acres of either timberland or brush land were sprayed using 2,4,5-T diluted with diesel oil. The spraying contract specified that two pounds 2,4,5-T acid equivalent be applied per acre and that a cost of $9.45 per acre be paid. The 2,4,5-T (4 pound acid equivalent) was diluted with diesel oil, using one-half gallon of the 4-pound acid equivalent 2,4,5-T to two gallons of diesel oil. Each acre was to receive a total of 2½ gallons of the above mixture.

A helicopter equipped for general spray work was used. 45-foot spray swaths were covered by the helicopter guided by rodmen stationed along the tract boundaries using long poles topped with brightly colored flags. While spraying the helicopter maintains an average speed of from 40 to 45 miles per hour and releases the spray just above tree top level. Under favorable conditions 100 acres of forest land can be sprayed in one hour's time. The spraying progresses rapidly once it starts, but weather conditions are all important. Very little wind movement can be tolerated for fear of injurious drift to adjacent areas. Adjacent areas with crops sensitive to the spray can be killed if much drift occurs pointing out one of the hazards of aerial application of silvicides.

Results of aerial spraying (using silvicides for forestry purposes) can best be evaluated during mid-summer or later the next growing season after spraying; this allows enough time for resprouting to show up. In July 1957 the Virginia Division of Forestry measured the effects of the spraying by a sampling procedure employing circular plots regularly distributed over the sprayed tracts. Plot size used varied with the size of the tree growth present -- for low brush, 0.001-acre - plot radius 3.72 feet; for taller brush, 0.005-

*The most effective time of year for this type of spraying is during July

acre - 8.33 foot radius; for trees, 0.05-acre - 26.3 foot radius. Within each plot the following were measured or appraised:

1. Effect of spray on different hardwoods present, both high and low shade. Trees were tallied into one of the following categories depending on how tree was affected by spray: Dead (80% or more defoliated); Severe (50 - 80% defoliated); Light (20 - 50% defoliated); and, None (less than 20% defoliated).
2. Release benefits to pine present -- based on five living pines nearest plot center.
3. Effect of spray on pines present.
4. Resprouting which occurs on sprayed trees.
5. General effect of spray on other vegetation present -- such as honeysuckle, etc.

Results of this sampling work may be found next in this report. The four tracts sprayed will be identified by number and prefacing each will be a brief description of the tract followed by a tabular presentation of the trees sampled noting effect of spraying on them.

Tract 1:

Mixed hardwood stand ranging up to 16 inches DBH. Oaks comprised 30 percent, by number, of the tree species present. Two general crown canopies present, both high shade (oaks, hickory, maple) and low shade (hickory, maple, dogwood, and sourwood). Some 514 trees per acre were present averaging 5 inches DBH.

The above stand was underplanted using loblolly pine seedlings during the 1956-57 planting season. The planting rate was approximately 1,000 seedlings per acre based on a 6' by 7' spacing. The landowner contracted to have the spraying done in order to release the planted pines.

Results of the Spraying

Tract #1

Extent of Kill	Species																	
	White Oak		Red Oak		Gum		Hickory		Red Maple		Y. Poplar		*Other		All Species	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dead	40	73	29	73	5	56	5	11	19	34	9	60	31	34	138	44
Severe	8	14	6	15	2	22	3	7	15	26	6	40	18	20	58	19
Light	6	11	3	7	2	22	7	15	16	28	-	-	17	19	51	16
None	1	2	2	5	-	-	30	67	7	12	-	-	24	27	64	21
Total No. Sampled	55	100	40	100	9	100	45	100	57	100	15	100	90	100	311	100

*Includes sourwood, dogwood, beech.

Remarks:

1. The spraying was not successful for the intended purpose -- to release the planted pines. The low shade canopy (hickory, maple, dogwood and sourwood) is still virtually intact over most of the area and is suppressing the planted pines. The plot data indicated that only 12 planted trees per acre were free to grow as a result of the spraying work carried out.

2. A good kill of oaks resulted. Nearly 90% of the oaks present fell into either the dead or severe category. Where oaks predominated (ridges, etc.) the results of the spraying were almost spectacular.

3. Results of spray on species other than oaks were not as satisfying, however. Hickory was most resistant to spray effects and emerged almost unscathed, with red maple and other (dogwood, sourwood, etc.) also showing little reaction to the spray.

4. The yellow poplar which was present was strongly affected by the spray.

Tract 2:

The landowner was interested in having his cut-over timberland area sprayed for pasturage purposes. This particular tract had been repeatedly high-graded over the years, resulting in a preponderance of low-grade, low-value hardwoods averaging approximately 4 inches DBH. 770 trees per acre were present ranging up to 14 inches DBH with quite an assortment of different tree species being present. Hickory was the most numerous comprising nearly 20 percent of the total stand.

A two-story crown canopy was again present with sourwood, dogwood, gum, red bud, and ash (to name a few of the species) present in the lower crown canopy level. Oaks and hickory predominated in the upper crown levels. An alder thicket was present along the creek and also present along the creek was a pure pole-sized sweet gum stand.

Results of the Spraying

Tract #2

Extent of Kill	Species															
	White Oak		Red Oak		Gum		Hickory		Red Maple		Y. Poplar		*Other		All Species	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dead	37	67	31	72	21	66	13	12	10	22	19	41	27	13	158	29
Severe	15	27	9	21	4	12	13	12	14	30	16	35	26	12	97	18
Light	2	4	3	7	6	19	37	36	19	41	9	20	89	42	165	31
None	1	2	-	-	1	3	42	40	3	7	2	4	71	33	120	22
Total No. Sampled	55	100	43	100	32	100	105	100	46	100	46	100	213	100	540	100

*Includes sourwood, dogwood, beech.

Remarks:

1. Percentagewise, all species combined, approximately 47 percent of the trees on the tract were either killed or were severely affected by the spraying.

2. Hickory, which was numerous, was lightly affected by the spray.

3. Alder was 100 percent top killed, but 25 percent of these resprouted from the base.

4. The pure stand of pole-size sweet gum was almost completely defoliated as a result of the spraying and resprouting was insignificant.

5. The lower shade crown canopy (sourwood, dogwood, etc.) is still present and was not affected very much by the spray.

6. The stand, before spraying, had a fair stocking of yellow poplar present. 75 percent of this poplar was either severely damaged or killed outright.

Tract 3:

The majority of this tract consisted of scattering pockets and stands of Virginia and shortleaf pine of varying ages and sizes. Most of the pines present were in reproduction or pulpwood-sized stands. It appeared that most of the stand had been diameter limit cut within the past six years. Where the cutting was the heaviest, spindly whip-like pines were left as growing stock.

As a result of this cutting, honeysuckle encroached over a considerable portion of the stand, and dogwood, sourwood, sumac and other low-shade species became entrenched on the tract.

The above description will suffice for most of the tract save for a small acreage of medium-aged hardwoods. These hardwoods average perhaps 8 inches DBH and will range up to 16 inches DBH. Oaks, hickory, black gum, and red maple predominate as high level shade, with sourwood, dogwood, persimmon, wild black cherry, etc., forming the low shade canopy level.

Results of the Spraying

Tract #3

Extent of Kill	Species: *White Oak		Red Oak		Gum		Hickory		Red Maple		Y. Poplar		**Other		All Species	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dead	3	60	2	22	4	50	1	5	1	8	3	25	1	2	15	12
Severe	2	40	5	56	2	25	-	-	3	25	2	17	14	22	28	21
Light	-	-	1	11	-	-	4	19	1	8	1	8	25	39	32	24
None	-	-	1	11	2	25	16	76	7	59	6	50	24	37	56	43
Total No. Sampled	5	100	9	100	8	100	21	100	12	100	12	100	64	100	131	100

*Chestnut Oak primarily

**Sourwood, dogwood, sassafras, sumac

Remarks:

1. The pines present were not damaged by the spraying.

2. Again, hickory, red maple and the low-shade canopy level consisting of dogwood, sourwood, etc., were not affected by the spraying to any great extent.

3. Honeysuckle proved resistant to the spray.

4. Larger trees, especially oaks, proved susceptible to the spray, but a larger number of other species were not. Nearly 60 percent of all hardwood tree species present on the tract prior to spraying are still living.

Tract 4:

A heavily cut-over tract which reverted to brush after being cut. Some 55 percent of the area supported oak sprouts (a large percentage being chestnut oak). Before being sprayed more than 3,200 trees per acre were present (sprout clumps were counted as one tree). The low brush ranged up to 6 feet in height and tall brush up to 2 inches DBH. Practically all the tree

growth present fell into one or the other of these two categories. In addition to the oaks, black gum, red maple, hickory, sourwood, dogwood and sassafras were present.

Natural shortleaf and Virginia pine reproduction averaging 5 feet in height were present and found scattered over most of the tract. To reinforce this natural pine stocking which was present the landowner planted loblolly pine seedlings on the tract approximately two years before the tract was sprayed. The planted seedlings averaged approximately 2 feet in height at time of spraying. The pines present, especially the planted seedlings, were showing the effects of suppression and crowding from the hardwood brush present. The owner had the tract sprayed so that the pines would be released.

Results of the Spraying

Tract #4

Extent of Kill	Species															
	*White Oak		Red Oak		Gum		Hickory		Red Maple		Y. Poplar		**Other		All Species	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Dead	25	29	29	74	12	92	-	-	6	50	-	-	30	45	102	46
Severe	17	20	4	10	1	8	1	25	1	8	1	100	7	11	32	15
Light	11	13	1	3	-	-	-	-	4	34	-	-	9	13	25	11
None	33	38	5	13	-	-	3	75	1	8	-	-	21	31	63	28
Total No. Sampled	86	100	39	100	13	100	4	100	12	100	1	100	67	100	222	100

*Chestnut Oak primarily

**Sourwood, dogwood, sassafras, sumac

Remarks:

1. The spraying was successful in releasing a substantial percentage of pines (both planted and natural). Results of the sampling indicated that 77 percent of the plots had free-to-grow pines on them and averaged 471 free-to-grow pines per acre. Approximately one-half of the pines released were the planted pines.

2. The pines were not injured or damaged by the spraying.

3. Chestnut oak sprout growth was not strongly affected by the spraying.

4. Hickory, red maple, sourwood and dogwood also were not very susceptible to the spray.

5. 61 percent of all species present were either killed outright or severely damaged by the spraying.

6. Some resprouting following spraying was apparent. On the average, approximately 10 percent of all species present resprouted, with chestnut oak, red oak and black gum being the worst offenders.

Summary:

During late August 1956 four different timber tracts totaling approximately 400 acres located in Charlotte County, Virginia, were aerially sprayed to control unwanted hardwoods. 2,4,5-T diesel oil mixture was used and the contract specified that an equivalent of 2 pounds acid per acre be applied per acre. The cost of the spraying work was $9.45 per acre.

An evaluation of this spraying work was made by the Virginia Division of Forestry in July 1957. It was found that species usually of higher value such as oaks and yellow poplar proved very susceptible to the effects of the spray, whereas lower value species such as hickory and red maple were fairly resistant to the spray. Also, where a two story shade level canopy exists (high and low shade) the lower crown canopy remained virtually undamaged as a result of the spraying.

Therefore, it appears that tracts containing a high percentage of hickory or red maple or tracts on which a two story crown canopy is present over much of the tract that a single aerial spraying will not effectively control the unwanted hardwoods.

Best results of the spraying were obtained on Tract 4 which contained only one general shade canopy level (in this case, low) and upon which hickory and red maple tree species were not numerous. This particular tract was the only one on which it was felt that satisfactory results from the spraying were obtained.

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Virginia Division of Forestry

September 10, 1957